

**ON-LINE MOBILE STAFF DIRECTORY SERVICE: IMPLEMENTATION FOR  
THE COLLEGE OF ARTS AND SCIENCES (CAS) – UUM**

**ABDULLAH MOHAMMAD SALMAN MARIAN**

**UNIVERSITI UTARA MALAYSIA  
2008**

**On-line Mobile Staff Directory Service: Implementation for the  
College of Arts and Sciences (CAS) – UUM**

A thesis submitted to the Graduate School, College of Arts and Sciences in partial  
fulfilment of the requirements for the degree Master of Science (IT)

Universiti Utara Malaysia

By

**ABDULLAH MOHAMMAD SALMAN MARIAN**

(Matric No: 88593)

© ABDULLAH MOHAMMAD SALMAN MARIAN, 2008

All rights reserved



**KOLEJ SASTERA DAN SAINS**  
**(College of Arts and Sciences)**  
**Universiti Utara Malaysia**

**PERAKUAN KERJA KERTAS PROJEK**  
**(Certificate of Project Paper)**

Saya, yang bertandatangan, memperakukan bahawa  
(I, the undersigned, certify that)

**ABDULLAH MOHAMMAD SALMAN MARIAN**

calon untuk Ijazah  
(candidate for the degree of) **MSc. (IT)**

telah mengemukakan kertas projek yang bertajuk  
(has presented his/her project paper of the following title)

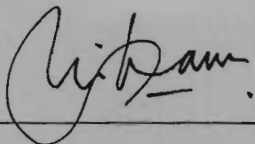
**ON-LINE MOBILE STAFF DIRECTORY SERVICE & IMPLEMENTATION**  
**FOR THE COLLEGE ARTS AND SCIENCES (CAS) - UUM**

seperti yang tercatat di muka surat tajuk dan kulit kertas projek  
(as it appears on the title page and front cover of project paper)

bahawa kertas projek tersebut boleh diterima dari segi bentuk serta kandungan  
dan meliputi bidang ilmu dengan memuaskan.  
(that the project paper acceptable in form and content, and that a satisfactory  
knowledge of the field is covered by the project paper).

Nama Penyelia Utama  
(Name of Main Supervisor): **MR. AHMAD HISHAM ZAINAL ABIDIN**

Tandatangan  
(Signature)

: 

Tarikh  
(Date)

: 25 MAY 2008

## **PERMISSION TO USE**

In presenting this thesis in partial fulfillment of the requirements for a Master of Science in IT degree from University Utara Malaysia, I agree that the University Library may make it freely available for inspection. I further agree that permission for copying of this thesis in any manner, in whole or in part, for scholarly purpose may be granted by my supervisor or, in their absence by the Dean of the Graduate School. It is understood that any copying or publication or use of this thesis or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to University Utara Malaysia for any scholarly use which may be made of any material from my thesis.

Requests for permission to copy or to make other use of materials in this thesis, in whole or in part, should be addressed to

**Dean of Graduate School  
University Utara Malaysia  
06010 UUM Sintok  
Kedah Darul Aman.**

## **ABSTRACT**

Mobile Directory Services came to exist to help users to find the information they need wherever and whenever they are. With the increasing popularity of mobile communications and mobile computing, the demand for mobile directory services applications grows. This study leads to develop mobile web based directory service for college of Art and Science to provide students with information and services about lecturers or supervisors via their hand phones.

## ACKNOWLEDGEMENTS

First, I would like to express my appreciation to Allah, the Most Merciful and, the Most Compassionate who has granted me the ability and willing to start and complete this study. I do pray to His Greatness to inspire and enable me to continue the work for the benefits of humanity.

After that, my most profound thankfulness goes to my supervisor **Mr. Ahmad Hisham Zainal Abidin** for his scientifically proven and creativity encouraging guidance and great support in this study.

Last, I wish to thank my Father, Mother who were always there for me by giving everything they have, my brothers and sisters for their love and support.

Thank you UUM.

Abdullah.M.S.Marian

May 29, 2008

## TABLE OF CONTENT

<b>PERMISSION TO USE.....</b>	<b>i</b>
<b>ABSTRACT.....</b>	<b>ii</b>
<b>ACKNOWLEDGEMENT.....</b>	<b>iii</b>
<b>TABLE OF CONTENT.....</b>	<b>iv</b>
<b>LIST OF TABLES.....</b>	<b>vi</b>
<b>LIST OF FIGURES.....</b>	<b>vii</b>
<b>LIST OF ABBREVIATIONS.....</b>	<b>viii</b>
 <b>CHAPTER 1: INTRODUCTION.....</b>	 <b>1</b>
1.1 Background.....	1
1.2 Problem Statement.....	2
1.3 Research Objectives.....	3
1.4 Scope of the Study.....	4
1.5 Significance of the Study.....	4
1.6 Organization of the report.....	5
1.7 Summary.....	6
 <b>CHAPTER 2: LITERATURE REVIEW.....</b>	 <b>7</b>
2.1 Mobile Web Based Application.....	7
2.2 Directory Services.....	10
2.3 Mobile Directory Services.....	14
2.4 Summary.....	19
 <b>CHAPTER 3: RESEARCH METHODOLOGY.....</b>	 <b>20</b>
3.1 Conceptual Framework.....	20
3.2 Sytem Architecture.....	22
3.2 Design Research Methodology.....	23
3.2.1 Phase 1: Awareness of Problem.....	25
3.2.2 Phase2: Suggestion.....	25
3.2.3 Phase 3: Development.....	26
3.2.4 Phases 4 and 5: Evaluation and Conclusion.....	26
3.3 Summary.....	27
 <b>CHAPTER 4: FINDINGS AND RESULTS.....</b>	 <b>28</b>
4.1 First Phase (Awareness of Problem).....	28
4.2 Second Phase (Suggestion).....	30
4.3 Development (Third Phase).....	35
4.3.1 Coding and Maintainance.....	35
4.3.2 Functionality.....	37
4.4 Evaluation (Fourth Phase).....	39
4.4.1 Technology Acceptance Model (TAM).....	39
4.5 Summary Conclusion.....	51
 <b>CHAPTER 5: CONCLUSION.....</b>	 <b>52</b>
5.1 Finding.....	52
5.2 Problems and limitations.....	53

5.3 Contribution of the Study.....	53
5.4 Future work.....	53
5.5 Summary .....	54
<b>REFERENCES.....</b>	<b>55</b>
<b>APPENDIX A: FEASIBILITY SURVEY .....</b>	<b>60</b>
<b>APPENDIX B: TAM QUESTIONNAIRE.....</b>	<b>62-63</b>



## LIST OF TABLES

NO	TABLE'S TITLE	PAGE
4.1	Descriptions for All Use Cases	32
4.2	Statistics for User Evaluation Part	42
4.3	Votes for the First Question	43
4.4	Votes for the Second Question	44
4.5	Votes for the Third Question	45
4.6	Votes for the Fourth Question	46
4.7	Votes for the Fifth Question	47
4.8	Votes for the Sixth Question	48
4.9	Votes for the Seventh Question	49
4.10	Votes for the Eighth Question	50

## LIST OF FIGURES

NO	TITLE OF THE FIGURE	PAGE
2.1	M-Commerce System	8
2.2	System Architecture for Information System	9
2.3	Service Discovery & Delivery Workflow	17
3.1	The Existing Framework	21
3.2	The Conceptual Framework of the New System	21
3.3	System Architecture	22
3.4	The General Methodology of Design Research	23
4.1	Model Architecture for the System	30
4.2	Use Case Diagram for the System	31
4.3	Sequence Diagram for (administrator: add staff)	34
4.4	Sequence Diagram for (student: search by alphabet)	34
4.5	Class Diagram for the System	35
4.6	Hardware Components for the System	36
4.7	Screenshot for Search for Staff WAP Page	37
4.8	Screenshot for Staff List WAP Page	38
4.9	Screenshot for Staff Information WAP Page	38
4.10	Gender Pie Chart	40
4.11	Occupation Pie Chart	41
4.12	Nationality Pie Chart	41
4.13	Pie Chart for First Question	43
4.14	Pie Chart for Second Question	44
4.15	Pie Chart for Third Question	45
4.16	Pie Chart for Fourth Question	46
4.17	Pie Chart for Fifth Question	47
4.18	Pie Chart for Sixth Question	48
4.19	Pie Chart for Seventh Question	49
4.20	Pie Chart for Eighth Question	50
4.21	Usefulness Pie Chart	51
4.22	Clearness Pie Chart	51

## LIST OF ABBREVIATIONS

API	Application Program Interface
DAP	Directory Access Protocol
DIS	Directory Information Server
HTML	HyperText Markup Language
IDE	Integrated Development Environment
JSP	Java Server Pages
LDAP	Lightweight Directory Access Protocol
MBSD	Model Based Service Directory
MI	Mobile Internet
OMG	Object Management Group
OMSDS	Online Mobile Staff Directory Service
PDA	Personal Digital Assistant
PUEU	Perceived Usefulness and Ease of Use
RDBMS	Relational Database Management system
RUP	Rational Unified Process
TAM	Technology Acceptance Model
UML	Unified Modelling Language
UUM	Universiti Utara Malaysia
WAP	Wireless Application Protocol
WML	Wireless Markup Language

# **CHAPTER 1**

## **INTRODUCTION**

This chapter briefly explains the background of the study, in which we will discuss the utilizing of mobile web based technology in developing an online directory service to help students retrieve contact details and information about one given academic staff. The problem statement, objectives, significance and scope of the study will also be introduced.

### **1.1 Background**

With the rapid development of computer science technology and the popularity of web solutions, the Internet has become a major means for collecting and displaying information. Many computer applications are developed to help users make decisions concerning the management of staff information, and communication through and outside the organization (Steiner et. al, 2005).

The explosive growth of mobile devices including phones, personal digital assistants and pagers presents tremendous opportunities for companies to increase sales, improve productivity, and provide better service. But simply making existing applications available over mobile devices doesn't completely capitalize on the

The contents of  
the thesis is for  
internal user  
only

## References:

- Akkiraju, R., Goodwin, P., & Doshi, S. (2003). *A Method for Semantically Enhancing the Service Discovery Capabilities of UDDI*. Paper presented at the Workshop on Information Integration on the Web (IIWeb-03), Acapulco, Mexico.
- Bustamant, F. E., Widener, P., & Schwan, K. (2001). the case for proactive directory services. *Super computing* 3(11), 112-118.
- Carzaniga, A., Rosenblum, D. S., & Wolf, A. L. (2001). Design and evaluation of a wide-area event notification service. *ACM Transactions on Computer Systems*, 19(3), 332-382.
- Chang, Y. C., Chen, J. L., & Tseng, W. M. (2005). A Mobile Commerce Framework Based on Web Services Architecture. *Information Technology: Coding and Computing, 2005. ITCC 2005. International Conference on*, 1(403 - 408).
- Church, K., Smyth, B., Cotter, P., & Bradley, K. (2007). Mobile information access: A study of emerging search behavior on the mobile Internet. *ACM Trans. Web* 1, 1 4.
- Cohen, D., Herscovici, M., Petruschka, Y., Maarek, Y. S., & Soffer, A. (2002). *Personalized pocket directories for mobile devices*. Paper presented at the In Proceedings of the 11th international Conference on World Wide Web Honolulu, Hawaii, USA.
- Czerwinski, S., Zhao, B., & Hodes, T. (1999). An architecture for a secure service directory service. *ACM Transactions on Computer Systems*, 5(1), 24-35.
- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319-340.
- Dickinger, A., Heinzmann, P., & Qwer, A. (2005). Mobile Environmental Applications. *Proceedings of the 38th Hawaii International Conference on System Sciences*, 1-8.

- Doulkeridis, E. (2003). *Towards a Context Aware Service Directory* Paper presented at the In the Proceedings of the 4th VLDB Workshop on Technologies on E-Services (TES'03), Berlin, Germany.
- Doulkeridis, M., & Vazirgiannis, T. (2004). *Querying and Updating a Context Aware Service Directory in Mobile Environments* (Technical Report).
- Fitzgerald, S., Foster, I., & Kesselman, C. (2006). A directory service for configuring high-performance distributed computation. *High Performance Distributed Computing*, 6(3), 365–375.
- Hascher, W. (2004). GPS: bald u berall, Elektronik. *Electronic Markets*, 26–29.
- Helal, S. (2002). Standards for service discovery and delivery. *IEEE Pervasive Computing*, 1(3), 95 – 100.
- Hofreiter, B., & Huemer, C. K. (2002). Web XML Status , Research Issues, and Obstacles. In *12th Int. Workshop on Research Issues on Data Engineering (RIDE02)*.
- IDC. (n.d). Internet Directories. Feb,24 ,2008, from <http://www.idc.com>
- ISO/IEC. (1995). Information Technology – Open Distributed Processing – ODP Trading Function.
- ITU-T. (1992). Information Technology – Open Systems Interconnection – The Directory. *Abstract Service Definition*
- Jeckle, T., & Zengler, W. (2002). Active UDDI an Extension to UDDI for Dynamic and Fault-Tolerant Service Invocation. *Electronic Markets*, 12(2), 33-40.
- Kim, J., Baratto R. A, & Nieh , J. (2006). *pTHINC: A ThinClient Architecture for Mobile Wireless Web*. Paper presented at the 15th international conference on World Wide Web WWW '06.

- Kouadri , M., & Hirsbrunner, B. (2005). *Towards a Context Based Service Composition Framework*. Paper presented at the In the Proc.of the 1st Int. Conf. on WebServices (ICWS'03), LasVegas,USA.
- Lee, C., Helal, A., & Desai, N. (2003 ). Konark: A system and protocols for device independent, peer-to-peer discovery and delivery of mobile services. *IEEE Transactions on Systems, Man and Cybernetics*, 33(6), 682 – 696.
- Leonhardt , U., & Magee, J. (1996). Towards a general location service for mobile environments. *in Proc. 3rd Int. Workshop on Services in Distributed and Networked Environments (SDNE '96)*, 43–50.
- Lombardi, D. (2001). A Proposal for UF Directory Services, University of Florida. *Electronic Markets*, 3(1), 123-128.
- Maass, H. (1998). Location-aware mobile applications based on directory services. *Netw. Appl*, 3(2), 157-173.
- MDA. (n.d). Model Driven Architecture. Retrieved March 5, 2008, from <http://www.omg.org/mda>
- Moreau, L. (2002). A fault-tolerant directory service for mobile agents based on forwarding pointers. *In Proceedings of the 2002 ACM Symposium on Applied Computing*, 93-100.
- Oracle. (2001). Leveraging Location-Based Services for Mobile Applications.
- Paolucci, T., Kawamura, T. R., Payne, K., & Sycara, P. (2006). Semantic Matching of Web Services Capabilities. *In Proc.of the 1st Int. Semantic Web Conf. on The Semantic Web*.
- Pokraev, J., Koolwaaij, M., & Wibbels, D. (2004). Extending UDDI with Context-Aware Features Based on Semantic Service Descriptions. *In Proc. Of the 1st Int. Conf. on Web Services (ICWS'03)*.



- Ramsay, M., & Nielsen, J. (2000 ). *WAP Usability: 2000 All Over Again*: Nielsen Norman Group.
- RFC. (1995). Lightweight directory access protocol Retrieved January 6 , 2008 from [www.rfc-editor.org](http://www.rfc-editor.org)
- Robbins , C. J., & Onions , J. P. (1992). The ISO Development Environment: User's Manual. *Electronic Markets*, 8(1), 455-467.
- Satyanarayanan, M. (2001). Pervasive Computing: Vision and Challenges *IEEE Personal Communications*.
- Schilit, B. N., & Theimer, M. M. (1994). Disseminating active map information to mobile hosts, IEEE Network. *Electro Engineering*, 22-32.
- Segall, B., & Arnold, D. (1997). publish subscribe directory service with quenching. *AUU computing*, 2(1), 243-255.
- Steen, P., Homburg, D., & Tanenbaum, A. (2003). A wide-area distributed directory system. *IEEE Concurrency*, 7(1), 70-78.
- Steiner, J., Minoura, T., & Xiong, W. (2005). Weatherinfo: A web Based weather Data Capture System, American Society of Agronomy.
- Strom. (2005). An information flow based approach to directory services. *Software Engineering*, 2, 129-133.
- Tian, M., Voigt, T., Naumowicz, T., Ritter, H., & Schiller, J. (2003). Performance Impact of Web Services on Internet Servers. *International Conference on Parallel and Distributed Computing and Systems*.
- Tierney, B., Aydt, R., & Gunter, D. (2002). A grid directory service architecture. *Global Grid*, 8(2), 1222-1129.

- Vahdat, M., Dahlin, T., & Anderson, W. (1999). Active names directories. *Internet Technology & Systems*, 7(2), 334-339.
- Vaishnavi, V., & Kuechler, B. (2004). Design Research in information system. Retrieved JAN 15, 2008, from <http://www.isworld.org/Researchdesign/drisISworld.htm>.
- Veizades, E., Guttman, C., & Perkins, S. (2004). Directory Service protocol. *Group Computer Working* 5(2), 335-441.
- Vixie, P. (2005). A mechanism for directory services implementation. *Computer Systems*, 4(3), 222-236.
- Want, B. N., Adams, N. I., Gold, K., & Petersen, D. (1995). An overview of the ParcTab ubiquitous computing experiment. *IEEE Personal Communications* 2(6), 28-42.
- Wu, H., Qiao, C., De, S., & TonguZ, O. (2001). Integrated Cellular and Ad Hoc Relaying Systems: iCAR", *IEEE Journal on Selected Areas in Communications*. 19(10), 2105-2113.
- Yang, K., Todd, C., & Ou, S. (2006). Model-based service discovery for future generation mobile systems. In *Proceedings of the 2006 international Conference on Wireless Communications and Mobile Computing* 973-978.